DOCUMENT RESUME

ED 140 610 FL 008 532

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TITLE Acquisition of Japanese Relative Clauses: A Case Study on a Two-Year-Old. Annual Reports, Vol. 1.
INSTITUTION International Christian Univ., Tokyo (Japan).
PUB DATE 76
NOTE 17p.; Case Study is part of a longitudinal study developed at the Division of Languages, International Christian University

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Child Language; *Comprehension Development; Imitation; *Japanese; *Language Development; Language Proficiency; Linguistic Performance; Longitudinal Studies; Perception; Preschool Children; Psycholinguistics; Sentence Structure; *Syntax; Verbal Development; Verbs
IDENTIFIERS *Relative Clauses

ABSTRACT

By age two, a child begins to form complex sentences by joining two or more sentences or by embedding one sentence into another. Formation of conjoined structures is a simpler process and emerges earlier than that of embedding structures. This paper attempts to answer the following questions: (1) Do children produce or understand embedding sentences correctly from the beginning of their acquisition or do they make mistakes? (2) Are there discrepancies between syntactic perception of embedding sentences and comprehension of the meaning? A longitudinal study of syntax development and acquisition of relative clause construction in one Japanese child forms the basis of the theory. Data consist of 120 elicited imitations of Japanese relative clause sentences, collected at ages 2:8, 2:9 and 2:10. Past studies on acquisition of relative clause construction deal with difficulty of acquisition of relative types. In the present study, four types of Japanese relative clause sentences were used for a total of 40 test sentences. Results indicate the subject-subject type was both imitated and comprehended best, and the comprehension score exceeds that of imitation for each type. Various theories accounting for differences in ease of acquisition are discussed. (CHK)

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Acquisition of Japanese Relative Clauses: A Case Study on a Two-Year Old*

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0. A child utters his/her first word around the first birthday; after that (s)he goes through the stages of so-called 'holophrastic' and 'telegraphic' speech. After his/her second birthday, the child begins to combine sentences to make complex sentences. There are two ways of combining sentences: conjoining two or more sentences, and embedding a sentence into another sentence.

It has been pointed out in many previous studies[1] that the emergence of conjoined structures is earlier than that of embedding structures. The order seems natural because the latter are in general subject to more syntactic operations than the former. One can thus predict that a child will have more difficulty in producing and understanding embedding sentences than conjoined sentences. This prediction has been borne out by such experimental studies as Sheldon (1974) for English, and Uyeno, Harada, Hayashibe, and Kiritani (1975) for Japanese.

But it is not so clear how a child processes embedding sentences at the very outset of their acquisition. More specifically, does the child produce or understand embedding sentences correctly from the beginning of the acquisition, or does (s)he make mistakes? If (s)he makes some mistakes, can we find any regularities in them? Are there any discrepancies between the syntactic perception of embedding sentences and the comprehension of the meaning?

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In this paper I will try to give a tentative answer to these questions, on the basis of evidence from a longitudinal study of the development of syntax in one Japanese child. The particular construction taken up here is the relative clause construction, one of the typical embedding constructions. The data consist of 120 elicited imitations of Japanese relative clause sentences, collected at the ages 2:8, 2:9, and 2:10 (years and months). By elicited imitations I refer, following Slobin and Welsh's (1967) definition, to "the child's repetition of a model sentence presented in a context calling for imitation, as opposed to the child's spontaneous imitation of adult utterances."

In §1, I will summarize the past works on the acquisition of relative clause sentences; in §2, I will describe the design of this study and report the results. Discussion of the results will be found in §3.

1. Past studies on the acquisition of relative clause constructions

Brown (1971), Sheldon (1974), and Smith (1974) have investigated American children's comprehension of the relative clause construction. The material sentences used are English relative clause sentences in which both the matrix and the relative clauses are transitive, i.e. consisting of a subject (S), an object (O), and a verb (V). They can be further classified into four types, SS, SO, OS, and OO, along the following two dimensions: (i) whether the head NP (H) functions as S or O in the matrix clause, and (ii) whether the NP in the relative clause to be deleted under identity to H (to which we will refer as the 'relativized' NP (R)) functions as S or O in the relative clause. An SS type sentence

is one in which both H and R function as S; an SO type sentence is one in which H functions as S, while R functions as O; an OS type sentence is one in which H functions as O, while R functions as S; and an OO type sentence is one in which both H and R function as O. The following list, from Sheldon (1974), illustrates sentences of each type.[2]

(1) SS: The dog that jumps over the pig bumps into the lion.

(2) SO: The lion that the horse bumps into jumps over the giraffe.

(3) OS: The pig bumps into the horse that jumps over the giraffe.

(4) OO: The dog stands on the horse that the giraffe jumps over.

Their results will be summarized in Table 1.

TABLE 1 SUMMARY OF PAST WORKS ON CHILDREN'S COMPREHENSION OF RELATIVE CLAUSE SENTENCES

	SUBJECTS		METHOD	RESULTS
	NO	AGE		
Brown (1971)	96	3:0-5:9	Referent Identification[3]	OS, SS > SO, OO
Sheldon (1974)	33	3:8-5:5	Act-out[4]	SS > OO≫ OS, SO
Smith (1974)	10	2:5-3:0	Elicited Imitation	OS > SS > OO > SO

A > B means that A elicited more correct responses than B, and A≫ B means that A elicited significantly more correct responses than B.

Brown and Smith argue that in general right-embedding (RE) constructions, i.e. OS and OO types, are better understood by the children than center-embedding (CE) constructions, i.e. SS and SO types, and also that comprehension of both RE's and CE's is easy when the R's function as the subjects of the relative clauses. Smith further claims that the data can be explained in terms of

Bever's NVN strategy[5] and Rosenbaum's Minimal Distance Principle (MDP).[6] The NVN strategy predicts that RE's (but not CE's) are easy in comprehension in that they allow the embedded clauses to be processed in the NVN or Agent-Action-Object fashion without interruption. The MDP, in Smith's version, predicts that the perceptually optimal structure will be the one in which the NP immediately preceding the relative clause (i.e. H) is the subject of the relative clause; i.e. SS and SO types will be processed more easily than OS and OO types. When combined, the NVN strategy and the MDP predict the order of easiness as given in Table 1, OS > SS > OO > SO, under the additional assumption that the NVN strategy is a more primitive (or higher-order) device than the MDP.

Sheldon's results are different from the others, and she proposes the Parallel Function Hypothesis (PFH) to account for them. The PFH predicts that those types in which both H and R function as S or O (i.e. SS and OO types) should be easier to process than those in which H and R have different grammatical functions (i.e. SO and OS types).

However the discrepancy is to be settled, it is obvious that children's comprehension of English relative clause sentences depends on their types. As far as English relative clause constructions are concerned, we cannot determine which of the three devices proposed (the NVN strategy, the MDP, and the PFH) plays a crucial role in the comprehension of relative clause sentences, nor can we decide which device is peculiar to English and which universal. These problems will be partially answered if we investigate the acquisition of the relative clause construction in

other languages, e.g. Japanese, which has very different syntactic features (at least on surface) from English. In particular, the Japanese relative clause construction has the relative clause immediately before H, while in English, the relative clause appears immediately after H. Furthermore, in Japanese, the relativized NP (the NP in the relative clause which is identical to H) is deleted on surface, while in English, it is realized as a relative pronoun and is moved to the beginning of the relative clause (and is optionally deleted later). Investigation of the Japanese relative clause construction will thus be expected to reveal the universal aspects of the development of the comprehension of relative clause constructions.

2. Description of the present experiments

2.0. I have been using controlled elicited imitations rather than the child's spontaneous speech as the primary data because the latter is unsuited for the purpose of the present study in the following two respects. First, the number of relative clause sentences in the child's spontaneous speech at the ages investigated is proportionally too small to make any (statistically or otherwise) significant generalization as to the status of such sentences in the child's grammar. Second, the spontaneous speech contains only the sentences that the child has felt like uttering and does not necessarily include everything she can produce nor those which she can understand but does not produce for one reason or another. Though she appears at first glance to have no difficulty in producing and understanding relative clause sentences in her spontaneous speech, her ability to use relative clause sentences

is actually confined to certain types (mostly to SS type), as the discussion below will soon reveal.

2.1. Materials

I have used the four types of Japanese relative clause sentences as models of imitation, SS, SO, OS, and OO type sentences. The following list provides a sample sentence for each type. Square brackets indicate the boundaries of the relative clause; the symbol Ø indicates the position that R, deleted on surface, originally occupied.

(5) SS: [Ø gohan o tabeta] Naomi-tyan ga
(Ø: S) meal object marker ate (Naomi-tyan: S) subject marker
hon o yonda.
book read
'Naomi, who had had a meal, read a book.'

(6) SO: [otoosan ga Ø sikatta] Naomi-tyan ga neko o tataita.
father (Ø: O) scolded (Naomi-tyan: S) cat beat
'Naomi, who her father scolded, beat a cat.'

(7) OS: otoosan wa [Ø omotya o kowasita] Naomi-tyan o sikatta.
(Ø: S) toy broke (Naomi-tyan: O)
'Naomi's father scolded her, who broke a toy.'

(8) OO: Naomi-tyan wa [okaasan ga Ø tukutta] yuuhan o tabeta.
mother (Ø: O) made (yuuhan: O) supper
'Naomi ate her supper which her mother made.'

In each session, a total of forty test sentences (ten of each type) were presented to the child. The same set of test sentences was given to the child at each age.[7]

2.2. Subject

The subject of this study is Naomi, my first daughter, born on Oct. 20, 1972. Both her parents are linguists. She had no siblings at the ages investigated.

2.3. Procedure

The child was asked to imitate the sentence the experimenter uttered. After the imitation, the experimenter checked the child's comprehension of the stimulus sentence by asking her questions about the contents of the stimulus, e.g. "Dare ga gohan o tabeta no?" (Who ate the meal?), and "Dare ga hon o yonda no?" (Who read the book?) for sentence (5). The interview was tape-recorded and transcribed for analysis.

The response was scored as a correct imitation when she repeated the stimulus perfectly or when she reproduced it with a minor change, e.g. in the choice of particles, provided that her comprehension was correct. The response was scored as comprehensionally correct only in case the subsequent interrogation revealed that she correctly understood the meanings of both the main and relative clauses.

2.4. Results

Overall, the results show that she made better imitations as she grew older. There was, however, no statistically significant difference between experimented ages in the frequency of correct performance, so that I will ignore the difference in age from the considerations below.

The number of correct responses, both in imitation and comprehension, is given in Table 2 for each construction type.

TABLE 2 NUMBER OF CORRECT RESPONSES FOR EACH TYPE OF RELATIVE CLAUSE SENTENCES (30 possible)

	SS	SO	OS	OO
Correct Imitation	27 (90.0)	7 (23.3)	6 (20.0)	4 (13.3)
Correct Comprehension	29 (96.7)	18 (60.0)	11 (36.7)	13 (43.3)

Percentage is given in parentheses.

3. Discussion

3.0. The first thing to note is that the SS type is far better than the other types, both in imitation and in comprehension: the tendency of facility being SS≫ SO > OS > OO for imitation and SS≫ SO > OO > OS for comprehension. Second, the score of comprehension exceeds that of imitation for each type.

3.1. On the priority of subject

The NVN strategy and the MDP make different predictions for Japanese, since they crucially depend on word order and the Japanese word order is different from the English one in that (i) in a simple clause, Japanese has the standard word order SOV, while English has SVO, and moreover (ii) Japanese has a relative clause immediately before H, while English has the relative clause immediately after H. The NVN strategy (or 'NNV' strategy, when adapted to Japanese) predicts left-embeddings (LE) (i.e. SS and SO types) are easier in comprehension than CE's (i.e. OS and OO types). MDP predicts that SO and OO types are more easily processed than SS and OS types. PFH predicts the same thing as for English, that SS and OO types are easier than SO and OS types. Table 3 shows the summary of predictions that the three devices make of the easiness of four types of relative clause sentences for English and Japanese.

TABLE 3 PREDICTIONS OF EASINESS MADE BY THE NVN (OR 'NNV') STRATEGY, THE MDP, AND THE PFH

	ENGLISH	JAPANESE
NVN (or NNV) strategy	OS, OO > SS, SO	SS, SO > OS, OO
MDP	SS, OS > SO, OO	SO, OO > SS, OS
PFH	SS, OO > SO, OS	SS, OO > SO, OS

The 'NNV' strategy can explain the difference in easiness between SS and SO on the one hand and OS and OO on the other. The difference between SS and SO, however, cannot be given an appropriate account by the devices proposed so far. I would like to propose the following Subject Priority Principle (SPP) to account for this discrepancy:

Subject Priority Principle (SPP)

> Subjects are more liable to grammatical and/or perceptual rules than objects and other NPs; when a rule R is applicable to either subjects or nonsubjects, its application to subjects is more frequent in sentence production, is easier to process in sentence comprehension, and appears earlier in child language acquisition.

The SPP is not an ad hoc principle devised only to account for the results of the present study. The SPP makes the same prediction both for English and Japanese, while the MDP can only account for English and not for Japanese, so that the SPP is more adequate than the MDP, in that it provides a more general account. Also, the SPP seems to work in the comprehension of other constructions, e.g. pseudo-cleft sentences such as (9) and (10).[8]

(9) Kame-san o butta no wa inu-san da.
turtle hit dog
'What hit the turtle is the dog.'

(10) Sika-san ga butta no wa inu-san da.
deer
'What the deer hit is the dog.'

The data in Matsuki (1974) show that sentences like (9) come to be understood earlier than (10). The 'NNV' strategy does not account for this fact, for it would incorrectly predict that (10) is easier to understand because the first noun is the subject.

Pseudo-cleft sentences seem to be interpreted through a special strategy that identifies the grammatical relation of the focus NP (underscored above), which we shall call the 'focus interpretation' (FI) strategy. Given such a strategy we see that SPP makes the correct prediction on the order of development, since it predicts that the FI strategy first comes to apply to cases where the focus is S and later to cases where the focus is other than S.

3.2. On the disparity between production and comprehension

As noted in §3.0, the tendency of easiness in imitation is SS≫ SO > OS > OO. This is different from that in comprehension not only in the order but also in the point that the former has an abrupt decrease in the ratio of correct responses of SS and the other types, while the latter shows a relatively gradual change of difficulty. Overall, the results of imitation can be accounted for equally well by the 'NNV' strategy and the SPP. The gap between SS and the other types still needs another way of explanation.

It should be noted in the first place that there is a general difference in child's performance between imitation and comprehension. In comprehension, what a child has to do is to receive a stimulus sentence and somehow interpret it. In imitation, in addition to the task of comprehension, he must retain the information about the particular syntactic structure employed to express the meaning, in order to reproduce the sentence. Since imitation requires more tasks on the child's part, it is natural that a child should get lower scores in imitation experiments. It thus seems reasonable to maintain that the process of comprehen-

sion of meaning and that of perception of the original syntactic structure used to express the meaning are different things, even though they are closely interrelated.

The present subject's imitation responses can be classified into three types, on the basis of their forms, disregarding whether the comprehension is correct or incorrect: responses in the form of relative clause sentences, conjoined sentences, and other constructions (such as simple sentences, non-sentences).

TABLE 4 SYNTACTIC STRUCTURES FOUND IN IMITATION (30 possible)

	SS	SO	OS	OO
Relative Clause Sentence	28 (93.3)	16 (53.3)	12 (40.0)	28 (93.3)
Conjoined Sentence	2 (6.7)	11 (36.7)	12 (40.0)	1 (3.3)
Others	0 (0)	3 (10.0)	6 (20.0)	1 (3.3)

Percentage is given in parentheses.

Table 4 represents this classification of elicited imitations. The striking fact is that the majority of SS types and OO types (93.3% for both) were reproduced correctly as relative clause sentences, although SS types were correctly understood but OO types were mostly misunderstood. The result of OO types is evidence for the hypothesis that semantic comprehension is independent from syntactic perception, since in OO types, the reproduction of the original syntactic structure is successfully achieved although the comprehension is very poor. Another thing observed from Table 4 is that SS and OO (as opposed to SO and OS) can easily be reproduced as relative clause sentences. This suggests that the PFH would work in reproducing relative clause sentences, i.e. that a child can easily reproduce a relative clause in which both H and R have the same grammatical functions. One way to resolve the contradic-

tion in results of past works on the English relative clause construction mentioned in §1 is to regard the 'NNV' strategy and the MDP (actually the SPP) as operative in comprehension, and the PFH as operative in reproduction.

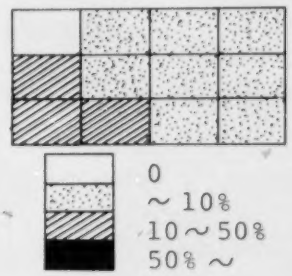
The disparity between production and comprehension is made clearer by an examination of the correlation between the syntactic forms of the responses and the types of comprehension (Table 5).

TABLE 5 CORRELATION BETWEEN SYNTACTIC STRUCTURES FOUND IN IMITATION AND TYPES OF COMPREHENSION[9]

(1) FOR TOTAL (120 possible)

O	0 (0)	4 (3.3)	1 (0.8)	5 (4.2)
C	13 (10.8)	4 (3.3)	3 (2.5)	6 (5.0)
RC	58 (48.3)	12 (10.0)	10 (8.3)	4 (3.3)
R / M	OK / OK	NO / OK	OK / NO	NO / NO

Percentage is given in parentheses

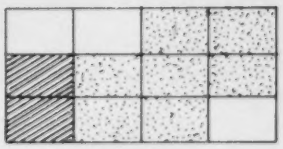


(2) FOR SS TYPE (30 possible)

O				
C	1 (3.3)			1 (3.3)
RC	28 (93.3)			
R / M	OK / OK	NO / OK	OK / NO	NO / NO

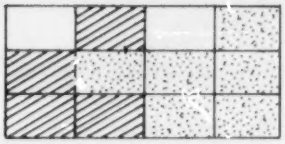
(3) FOR SO TYPE (30 possible)

O			1 (3.3)	2 (6.6)
C	6 (20.0)	2 (6.6)	1 (3.3)	2 (6.6)
RC	12 (40.0)	2 (6.6)	2 (6.6)	
R / M	OK / OK	NO / OK	OK / NO	NO / NO



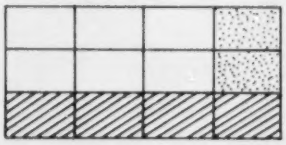
(4) FOR OS TYPE (30 possible)

O		4 (13.3)		2 (6.6)
C	6 (20.0)	2 (6.6)	2 (6.6)	2 (6.6)
RC	5 (16.6)	5 (16.6)	1 (3.3)	1 (3.3)
R	OK	NO	OK	NO
M	OK	OK	NO	NO



(5) FOR OO TYPE (30 possible)

O				1 (3.3)
C				1 (3.3)
RC	13 (43.3)	5 (16.6)	7(23.3)	3(10.0)
R	OK	NO	OK	NO
M	OK	OK	NO	NO



It can easily be seen from Table 5 that SS and OO types exhibit systematic response patterns, as opposed to SO and OS types, which exhibit almost all the possible kinds of response. SS type elicited correct responses both in imitation and comprehension, while OO type elicited responses correct in imitation but not in comprehension. We might contend that in the development of the ability to command relative clause constructions, the type which exhibits a systematic response pattern in Table 5 is acquired earlier than the type with random responses, thus predicting SS > OO > SO (>) OS. Verification of this prediction is left over to future study.

NOTES

* This is an interim report of part of a longitudinal study in progress of the development of syntax in one Japanese child.

I wish to express my gratitude to my daughter Naomi, whose cooperation made it possible for this study to come up. I benefited from discussion with S. I. Harada, H. Hayashibe, K. Matsuki, and H. Yamada. My special thanks are due to S. I. Harada for his advice on form and content of this paper.

1. For instance, see Okubo (1967) for Japanese and Slobin and Welsh (1967) for English.

2. In Smith's study, nonsense nouns were used instead of real nouns.

3. Referent identification is a method that requires children to respond to a stimulus by choosing the correct referent from a set of possible referents usually given in the form of a picture.

4. The act-out method is one in which children are required to act out the stimulus sentences, using toy animals and/or other gimmicks.

5. See Bever (1970).

6. See Rosenbaum (1967). Rosenbaum proposed the MDP to account for the recoverability of the NP of the embedded clause deleted by Equi NP Deletion under identity to an NP in the matrix, and regarded it as a grammatical principle. Smith, however, extended it to the relative clause cases, and regarded it as a principle operative in comprehension.

7. Sentences are either "reversible, in that the object of action could serve as the subject, or nonreversible, in that the object could not normally serve as the subject." (Slobin, 1966, p. 219) Thus, 'Taro ga Hanako o oikaketa' (Taro chased Hanako) is reversible since 'Hanako ga Taro o oikaketa' (Hanako chased Taro), a sentence with the two nouns reversed, also represents a possible situation, while 'Taro ga niku o tabeta' (Taro ate some meat) is irreversible since 'niku ga Taro o tabeta' (The meat ate Taro) cannot represent a possible or probable situation. It has been pointed out, e.g. in Hayashibe (1975) and Slobin (1966), that irreversible sentences elicit more correct responses than reversible ones at the same developmental stage.

The same thing can be said about relative clause constructions. All the stimulus sentences used here are irreversible except only two. I tried to exclude reversible sentences from the test items because they were too difficult for a two-year-old child to deal with (e.g. our subject failed to respond correctly to the two reversible ones). Thus, our subject got an extraordinary high scores for her age, in comparison with the results of other studies with reversible sentences as stimuli. For example, her scores roughly corresponds to those of ten-year-old

children in Uyeno, Harada, Hayashibe, and Yamada's study (to appear).

8. Sentences (9) and (10) are from Matsuki (1974).

9. "RC", "C", and "O" represent relative clause constructions, conjoined sentences, and other constructions respectively. "R" and "M" represent respectively the relative clause and the matrix clause of a relative clause construction. The indication "OK" or "NO" shows that a clause in question is correctly or incorrectly understood. Thus when combined, we have four types of comprehension: (i) perfect comprehension (R-OK and M-OK), (ii) partial comprehension (i.e. comprehension of either of R and M; R-NO and M-OK, or R-OK and M-NO), and (iii) complete failure to understand (R-NO and M-NO).

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